

Claims:

1. A method of production of carbon nanoparticles,  
comprising the steps of:  
5 providing on substrate particles a transition metal  
compound which is decomposable to yield the transition  
metal under conditions permitting carbon nanoparticle  
formation;  
contacting a gaseous carbon source with the substrate  
10 particles;  
before, during or after said contacting step,  
decomposing the transition metal compound to yield the  
transition metal on the substrate particles;  
forming carbon nanoparticles by decomposition of the  
15 carbon source catalysed by the transition metal;  
and  
collecting the carbon nanoparticles formed.
2. A method as claimed in Claim 1, wherein the transition  
20 metal compound is a transition metal salt.
3. A method as claimed in Claim 2, wherein the transition  
metal salt is a transition metal formate or oxalate.
- 25 4. A method as claimed in Claim 1 or Claim 2, wherein the  
transition metal compound is a transition metal  
carbonyl.

5. A method as claimed in Claim 4, wherein the transition metal compound is a multi metal atom transition metal carbonyl.
- 5 6. A method as claimed in any one of the preceding claims, wherein the transition metal is nickel, iron or cobalt.
7. A method as claimed in any one of the preceding claims, wherein the gaseous carbon source is a hydrocarbon or carbon monoxide.
- 10 8. A method as claimed in Claim 7, wherein the gaseous carbon source is methane or acetylene.
- 15 9. A method as claimed in any one of the preceding claims, wherein the gaseous carbon source is passed over the substrate particles.
10. A method as claimed in any one of the preceding claims, wherein the gaseous carbon source is mixed with a diluent.
- 20 11. A method as claimed in Claim 10, wherein the diluent is argon.
- 25 12. A method as claimed in any one of the preceding claims, wherein the substrate particles comprise oxide particles and/or silicate particles.

13.A method as claimed in Claim 12, wherein the substrate particles comprise one or more of silica, alumina,  $\text{CaSiO}_x$ , calcium oxide or magnesium oxide.

5 14.A method as claimed in any one of the preceding claims, wherein the substrate particles are in the form of a fumed powder, a colloid, a gel or an aerogel.

10 15.A method as claimed in any one of the preceding claims, wherein the transition metal compound is decomposed by heating.

15 16.A method as claimed in Claim 15, wherein the transition metal compound is decomposed by heating to a temperature between 200 °C and 1000°C.

17.A method as claimed in Claim 16, wherein the transition metal compound is decomposed by heating to a temperature between 600 °C and 1000 °C.

20 18.A method as claimed in any one of the preceding claims, wherein the carbon nanoparticles are carbon nanotubes.

25 19.A method as claimed in any one of the preceding claims, wherein the carbon nanotubes are single walled carbon nanotubes.

30 20.A method as claimed in any one of the preceding claims, further comprising the initial step of impregnating the substrate particles with the transition metal compound.

21.A method as claimed in any one of the preceding claims,  
where the method is continuous.

5 22.A method as claimed in Claim 21, comprising the steps of:  
continuously providing substrate particles;  
fluidising the substrate particles with a flow of gaseous  
carbon source;  
heating the transition metal compound on the substrate  
10 particles; and  
collecting the carbon nanoparticles formed by elution.

23.A method as claimed in Claim 21, comprising the steps of:  
continuously providing substrate particles to an upper  
15 part of an inclined surface;  
contacting the substrate particles on the inclined  
surface with a flow of gaseous carbon source;  
heating the transition metal compound on the substrate  
particles; and  
20 collecting carbon nanoparticles formed from a lower part  
of the inclined surface.

24.A method of production of carbon nanoparticles,  
comprising the steps of:  
25 providing on substrate particles a transition metal  
oxalate, formate or multi metal atom carbonyl;  
heating the transition metal oxalate, formate or multi  
metal atom carbonyl on the substrate particles;  
contacting a gaseous carbon source with the substrate

particles; and collecting the carbon nanoparticles formed.

25. A method as claimed in Claim 24, wherein the transition  
5 metal oxalate, formate or multi metal atom carbonyl is  
nickel formate and the substrate particles are silica  
particles.
26. Carbon nanoparticles formed by a method as claimed in  
10 any one of the preceding claims.